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BULLETIN

OF THE

TORREY BOTANICAL CLUB

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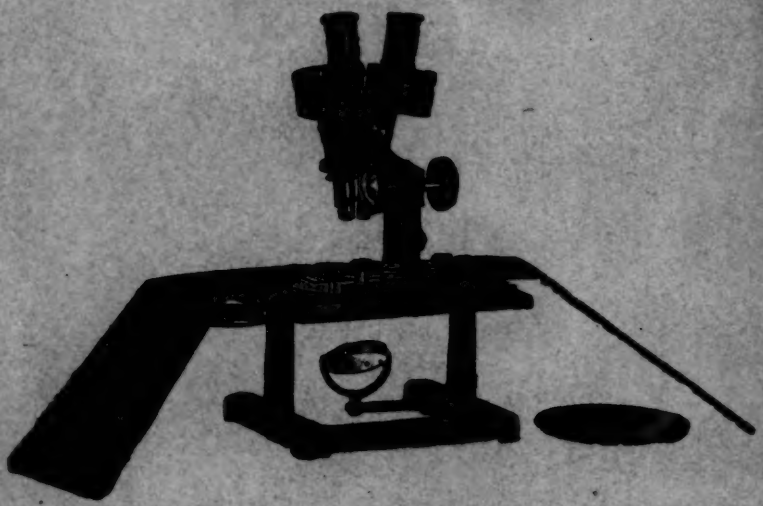

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Vol. 46 No. 6

BULLETIN

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TORREY BOTANICAL CLUB

JUNE, 1919

New and old species of Opuntia

DAVID GRIFFITHS

(WITH PLATES 9 AND 10)

It is desirable again to record a few facts resulting from our culture of species of *Opuntia* upon the Department of Agriculture grounds at Chico, California. The species here discussed have been under observation a long time. Eight are here described for the first time and two are recognized for the first time since originally described.

Opuntia effulgia sp. nov.

A glistening, dark green, compactly-branched, stocky, turgid species of the tree type, with heavy trunk and having a rounded bowl, height 1.5–2 m. with us now at six years of age, and having a spread of branch of about 2 m.; joints subcircular to broadly obovate, about 18 x 28 cm. thick, glossy, slightly raised at areoles and having a lighter indefinite spot on the tubercle below the areoles, finally becoming smooth surfaced; areoles at first brown with prominent wool, 2–3 mm. in diameter, enlarging in age to 5 mm. or more and becoming gray; spicules scarcely visible except on old trunks where they become 2–3 mm. long, in a compact tuft in upper part of areole, brown to light brown; spines few, short, white or mostly dirty gray, none to 1 or 2, 5–15 mm. long, small, straight, stout, flattened and curved on old trunks where they become stouter and a little longer, but never numerous; flowers yellow, small, 4 cm. in diameter, the petals nearly erect, turning pinkish late in the day, filaments at first greenish, style white, but both reddish-tinged in the afternoon; fruit subglobose, mostly

[The BULLETIN for May (46: 157–194. *pl. 8*) was issued May 23, 1919.]

deeply pitted or sunken, 5.5 x 7.5 cm., purplish, glossy dark red marked with irregular darker lines about areoles which are black with central tuft of brown spicules and one or more variegated, or brownish, fugacious spines 4 mm. long; rind thick, pulp light purplish-red and somewhat mottled, seeds small, dark, almost marginless, angular.

This species, characterized by its dark, glossy, bright green, bloomless, turgid, stocky aspect, and the nature of its fruits, might be referred to the spineless group. I am, however, not ready to associate it with any described botanical species, for in my opinion it is a spineless form of an undescribed spiny Mexican species whose limitations I am not yet familiar enough with. A few seedling generations would probably throw some light on its affinities, but I have not yet been able to grow them.

The type is my inventory No. 8040, secured at San Luis Potosi, Mexico, in August, 1905. It is commonly referred to as "nopal camueso" by the natives. It has been hardy at Chico, California, except during the freeze of 1913.

Opuntia cyanea sp. nov.

An erect, spreading, tree-like plant becoming 2–3 m. high at six years of age from cuttings and having a spread of about 3 m.; joints obovate, widest at upper third to fourth, slightly glaucous, decidedly blue-green, the last year's joints commonly 20 x 32 cm., but often larger and frequently very much smaller; areoles subcircular to ovate or even elliptical, 25–30 mm. apart on last year's joints, about 3 mm. long, brown, fading to a dirty gray; spicules straw-colored, not visible until second year and then only at base of joints where they continue to increase in a compact tuft 1 mm. or so in length for a year or more, but never becoming prominent; spines white, few, only an occasional one 1–1.5 cm. long in an occasional areole, turning to a dirty, semi-translucent condition, seldom increasing at all in age; flower buds dull, light greenish-red, short-conical pointed, flowers dull, light orange-red, developing more red as day advances and coloring still deeper after closing, often 7.5 cm. in diameter, filaments greenish, turning pink, style white, tinting a little toward close of day, stigma light green 10–12-parted, turning pinkish after closing; fruit light yellowish-white, palatable, rind of same color, pulp distinctly greenish even when fully ripe, subglobose to obovate, about 62 x 70 mm., with slightly concaved umbilicus, its areoles subcircular, 2.5 mm. in diameter, with prominent, tawny wool, and a central tuft of straw-colored spicules

projecting less than 1 mm. beyond wool, fugacious spines, few, brown to yellowish, 0.5–0.75 cm. long, mostly in upper areoles.

This species has come to us from various Mexican sources. I first secured it at Aguas Calientes, Mexico, in 1905; later at Mixcoac, Mexico. The type is established, however, upon plants grown from seed secured at Del Rio, Texas, July, 1908. The plants from which this seed was secured were brought originally from Mexico. The type is carried under my inventory No. 9410. One or possibly two other collections of it have been grown to maturity.

This is well characterized as a blue-green spineless (nearly) species with fruit pulp green and palatable. I have no suggestions regarding its spiny affinity at present.

Opuntia diversispina sp. nov.

Plants erect, tree-like, 1–1.5 m. high and with a similar spread, joints obovate, broadly rounded above, 14 x 25 cm., to broadest at middle, and pointed above and below and measuring 14 x 30 cm., dark, glossy green, but likely to be yellowish in exposed surfaces, slightly when at all raised at areoles the second year; areoles subcircular to broadly oval, 4 mm. in length, brown, turning dirty gray to black; spines on second season's growth 3 to 6, yellow, 12–15 mm. long or less, either porrect or sloping down on edges of joints the second year or late the first, becoming more recurved and increasing in number in age with a variable number, 20 to 30, spicule-like yellow bristles, 6–12 mm. long, scattered mainly through upper edge of areoles, widely spreading, and requiring careful examination to be distinguished from the spines, the lower portion of areole containing 2 to 4 white, delicate, wavy, bent and twisted hair-like bristles besides; spicules 1–2 mm. long in a compact tuft near upper edge of areole, but not appearing until late in the year or even not until the second year; flower buds dull red with segments closely appressed; flowers yellow, red exteriorly in portions of petals exposed in the bud, fading to a light pink late in the day, filaments greenish at base but mostly white, style white, stigma large, medium green, 8–9-parted, petals broadly rounded at apex, mucronate, becoming more or less laciniate late in the day; fruit subglobose to obovate about 22 x 30 mm., yellow or greenish, deeply pitted, its pulvini 2 mm. in diameter, tawny, bearing a profusion of flexuous, hair-like, weak, fugacious spines 10–12 mm. long. [PLATE 9.]

This species has been in our collection for many years. Its

origin is not known, but was grown from seed at our Brownsville station about 1910. The records regarding the origin of the packet of seed have been lost. It was sent us by some correspondent. It was hardy but difficult to grow out-of-doors at Brownsville, Texas, apparently on account of the excessive humidity, but we have been unable to grow it to fruitage in open ground at Chico, California, on account of low temperatures.

The description here written is from specimens grown in a sash house in which the sash is slipped into a permanent framework on the advent of cold weather in autumn and removed as soon as danger of hard freezes is over in the spring. This arrangement also protects the plants from the excessive winter rains of this locality. So far as spination is concerned this species is more closely related to *O. Scheeri* A. Weber than any other known to me. It fruits poorly with us at Chico, although there is always an abundant blossom. Most of the ovaries fall soon after anthesis and the few that remain seldom ripen into plump, normal fruits. Usually a half dozen fertile seed is the most we get from the few fruits that mature.

The type has been carried under our South Texas inventory No. 2836, ordinarily written S. T. G. 2836.

Opuntia hispanica sp. nov.

An erect to ascending, spreading, widely and almost divaricately branched species, 3 m. or more high, with about an equal spread, making a globular-topped tree or, when grown from cuttings and not trimmed, a large hemispherical shrub—a tree headed on the ground; joints 14–15 x 30–41 cm., narrow, obovate, long, gradually tapering below, bright dark green, edges more or less notched with the raised areoles but smooth after one year; areoles obovate, brown, becoming dirty black, 3 mm. long, enlarging in age to subcircular and 5 mm. in diameter; spicules not visible, yellow; spines very numerous, formidable, white with translucent tips, 2 to 6, mostly 3 or 4, porrect, diverging in all directions, flattened, twisted, not annular, the longer central 3–4 cm. and the others about 2 cm. with an occasional one only about 1 cm. long, increasing on old trunks to 10 or more and variously curved and bent, variable, some even 5 cm. long and porrect, when 4 usually 2 on same level in lower part of areole and the other two one above the other directly above and between the first two; buds blunt, short-pointed, dull dark greenish with only a little red, edges of

scales white, thin and almost fimbriate, flowers yellow, turning slightly orange late in the day, 5 cm. in diameter, filaments light yellow, style white or slightly tinted above, stigma very light green, conical, 8–10-parted; fruit large, pyriform, about 55 x 90 mm. with flat flower scar, greenish white, with large, subcircular, brown areoles, about 3 mm. in diameter, bearing a compact tuft of yellow spicules 1 mm. long in center and 1 to 5 delicate, fugacious spines below.

The species is known to me from a single number which was received from Senor Ambrosio Eschauzier, of Seville, Spain. It was received under the common name "Americanos." It is quite distinct from anything else which we have cultivated, particularly in its habit of growth, shape of its joints, and spination. In some of its vegetative characters it resembles most closely *O. gymnocarpa* A. Weber, but differs from that species in being exceedingly spiny in its branching habits and in color and general character of its fruit. The fruit has considerable similarity that to of *O. elongata* Haw., and the nature of the branching is also similar to that species. It is rapid of growth and new growth starts each year from just below the tip of the last joint, making a very open, awkward species to handle in the field on account of its widely spreading and even somewhat drooping habit of branching.

The species is quite hardy at Chico, California, having been only slightly injured during the severe freeze of 1913. The fruits are edible and belong to the "blanca" group of the Mexicans, in which the expressed juice is limpid with no solids in suspension.

The type is carried in our collection under Seed and Plant Introduction No. 15840, and was secured from Sr. Ambrosio Eschauzier, Seville, Spain, through the kindness of Sr. Francisco Eschauzier, San Luis Potosi, Mexico. There is little doubt that it is of Mexican origin, but it is known to me only from this inventory number.

Opuntia chata sp. nov.

An arborescent, compact, erect to ascending species 2–3 m. or more high and with an equivalent spread of branch; joints subcircular to broadly obovate 24 x 32 cm. or often only 18–20 cm. in diameter; glaucous, gray-green, slightly raised at areoles; areoles broadly obovate on sides of joints, more narrow on edges, brown, turning dirty black, 2–3 mm. long, becoming subcircular and

enlarged in age; spines white, short, porrect, diverging, at one year of age, about 1 cm. or less in length, straight, stiff, but not stout, all but lowermost areoles armed, very variable in number, averaging 2 to 5; mostly about 4, later increasing irregularly to 6 to 10 and in length to 2 cm.; spicules yellow in a compact tuft one mm. long in upper part of areole, at first surrounded by narrow zone of brown wool, but this soon crowded out by increased spicular growth, not becoming any more conspicuous in age; flowers yellow, rather undersized, inclined to be slightly greenish tinged within, seldom 5 cm. in diameter when fully open; fruit obovate about 45 x 58 mm. yellowish-white, bleaching towards spring to a dirty white, rind same color as epidermis, pulp purplish-red and difficult of separation from the thick rind.

The species is one of the stockiest and strongest growers we have in our plantation, but it is not rapid in its vegetative growth like some of the spineless forms. It is a striking species for many reasons. Its glaucous, gray-green color is attractive. Its fruits are medium sized, not edible raw, but are used cooked and pickled. It is remarkable from the fact that the fruits cling on the plants until the next season in its natural habitat, but with us in California there may be a few fruits holding over even to the third year. They never, however, like some other species become incorporated as a permanent part of the plant. It is a remarkable thing also that under our conditions we seldom, if ever, have perfect fruits upon the plants in the spring, they being more subject to injury from low temperatures than the plant itself. Consequently, it is the rule to find practically all the fruits injured slightly on one side by cold weather in the spring. They, however, appear to mature perfectly in autumn.

The type is preserved under my inventory No. 8086 and was collected originally at Aguas Calientes, Mexico, August, 1905. It has been grown by us successfully in the open at Brownsville, Texas, and at Chico, California; also under winter protection at San Antonio, Texas. Almost no injury occurred to it at Chico even in 1913 except that the plants were badly bent down by the weight of the snow. At both Brownsville and Chico seedlings of the species have been grown to maturity under outdoor conditions and they are indistinguishable from the parent plants, which are vegetatively propagated from the type collection.

Opuntia Maideni sp. nov.

An erect to ascending, spreading, rather compactly branched, hemispherical shrub 1–1.5 m. in height; joints obovate, about 9 x 18 cm. at one year of age, at first raised at areoles and slightly so the second year, rather light, glaucous green; areoles broadly obovate, 4 mm. long, enlarging and becoming subcircular in age, tawny, becoming dirty black; leaves short, subulate, terete, cuspidate, pointed, 5 mm. long; spicules yellow, in a compact, 2 mm. tuft in upper portion of the areole, but surrounded above by a narrow zone of tawny wool, increasing to 3 mm. in length and occupying the entire areole in age; spines at first yellowish, turning white, very variable in all characteristics, sometimes the second year 1 or 2, sometimes none, 1 cm. long or less, or again they may be 4 in number and 3 cm. long, flattened and twisted, not increasing much in numbers on old wood, but often becoming 4 cm. in length; buds sharp-pointed, light green with appressed segments; flowers yellow, slightly greenish within, filaments greenish below, yellow distally, style bright deep red above, white below, stigma deep green, 7-parted, petals obovate to cuneiform, rounded, cuspidate above, about 28 x 40 mm.; fruits obovate to subglobose, deeply pitted, 2.5 x 3 cm., bearing about 15 areoles which contain one central tuft of yellow spicules 2 mm. long and 3 to 8 fugacious, hair-like spines, 1 cm. or less in length.

My knowledge of this perfectly characteristic species is derived from a specimen received from Professor J. H. Maiden, in whose honor it is named. He received it from some European collection. Its origin is unknown. I have received it from no other source. It was transmitted by Professor Maiden under No. 42 and is carried in our collections as M. 42. For years it was carried under protection at Chico, but for the past three years it has survived in the field without injury.

OPUNTIA BARTRAMI Raf.

Opuntia Bartrami Raf. Atlantic Jour. 1: 146. 1832.

An erect to ascending, rather strict and sparingly branched plant a meter or less high; joints elliptical to ovate, usually more or less pointed above and below; often 8 x 18 cm. or again small, 5 x 8 cm., often in current season's growth widest at middle and gradually narrowed each way, surface smooth, dark green, leaves conspicuous dull, reddish-green, 14–18 mm. long, somewhat curved outward; areoles subcircular to broadly obovate, 3 mm. long, brown; spicules yellow, in a compact tuft in central portion of

areole, 2–3 mm. long, increasing in age and filling entire areole; spines few, short, none or an occasional one, white to dirty gray, 3–5 mm. in length; flowers yellow, turning to orange-red when closed, but only slightly darker yellow at close of day; filaments orange, petals broadly obovate to spatulate about 26 x 45 mm., style white, stigma white, six-parted, small, rounded and minutely cuspidate above; fruit long, obovate, sometimes 24 x 55 mm., or often only 18 x 25 mm., dull, dark red, with the color extending only half way through the rind, interior being colorless.

This species is more or less common on the Florida Coast, in the region of New Smyrna. It is a rather striking thing, inasmuch as it is erect and strict in habit, and has few spines or may even be entirely spineless. The specimens from which the description is drawn have been carried by us under P. I. G. No. 13277, and were collected near New Smyrna, Florida, October 25, 1912, by Mr. R. A. Young. The specimens seem to me to be quite clearly referable to the Rafinesquean species, established in honor of the traveler Bartram.

The points upon which one must base judgment here are mainly four:—(1) habit and habitat of plant; (2) absence of spines; (3) color of fruit; (4) shape of joints. The same species was collected by myself at New Smyrna, Florida, several years before, and was grown to maturity at San Antonio, Texas, and Chico, California, but the number was lost. It is more than probable, however, that we still have that original collection of mine represented in No. 13777, P. I. G., which has been field-grown with us at Chico for a number of years, but with no record of its origin. It is identical with the one here described.

Opuntia obovata sp. nov.

A beautiful, glaucous, gray-green, erect species about 3–4 m. in height when fully developed, but blossoming profusely with us at 1 m. when grown from cuttings, rather widely branched but distinctly arborescent even in vegetatively propagated plants; joints long, obovate, broadly rounded above and gradually narrowed below, commonly 20 x 38 cm. or again frequently 15 x 35 cm., glaucous gray-green, turning yellowish green in age, raised at areoles when young and not losing tuberculation entirely until the third year; areoles brown, gray the second year and finally black, subcircular or triangular, abour 2.5 mm. in diameter, becoming enlarged on old trunks to frequently one cm. in diameter,

practically all armed; spicules yellow, invisible until third year and then in a small, compact, inconspicuous tuft in upper portions of areole, never conspicuous; spines white with translucent tips, flattened, twisted, not annular, becoming dirty gray, on last year's joints mostly 2 or 3 with 4 commonly on edges, the longest upper central one 3–3.5 cm. long, the others gradually smaller down to 8 mm. in length, on joints two years of age increasing about one to the areole and the longest are 3.5–4 cm. and the others in proportion and increasing even beyond this in both numbers and length, all rather stout; flowers yellow about 6 cm. in diameter, filaments greenish at base, style slightly tinged, stigma light greenish-yellow, 10-parted; fruit turning yellowish but soon approaching orange but not so deep as *naranjada* of the Mexicans, having a faint tinge of pink, long, obovate, with prominent dark brown areoles broadly obovate to subcircular and 3 mm. long, 15–16 mm. apart at the middle, more crowded and more elongated above, its spicules yellow, short, and central, surrounded by the 1 mm. long wool, subtended by 1 to 4 variable, mottled, delicate, fugacious, hairlike spines in the upper areoles.

This, which I collected at Hepasote, Mexico, is one of the finest fruited of the Mexican pears. The fruit is quite characteristic, palatable and belongs to the general "blanca-amarilla" groups. When first matured it is a typical "blanca" but soon it would pass more readily for "amarilla." It is a very spiny species, consequently I doubted whether it should have the common name "liso," but several peons, to whom we are always obliged to refer for common names, insisted that this is the one by which it is commonly designated. The pulp is readily separable from the seed and the nutritive materials, unlike "tuna cardona" (*O. streptacantha*) is held in solution. When the pulp is removed preparatory for eating it is considerably red-colored in the rind and both the interior and exterior of the pulp have a decidedly orange cast. It is a large sized tuna, commonly 5 x 9 cm., and slightly to deeply pitted. The species has not been seriously injured by cold at Chico except in January, 1913, when our stock was all reduced to cuttings. As frequently happens with these plants the articulation between the joints is weakened first and the trunks may be killed when the outer joints may be saved by planting after a period of recovery from the effect of cold.

The type is preserved under my collection No. 8071 and was secured at Hepasote, Mexico, in August, 1905. It has been in

cultivation with us since that date at both the Texas stations and Chico, California. At San Antonio, Texas, winter protection was necessary.

OPUNTIA MARITIMA Raf.

Opuntia maritima Raf. Fl. Med. 2: 247. 1830 (*nomen nudum*); Atlantic Jour. 1: 146. 1832.

A hemispherical shrub a meter or less in height with erect, ascending, or even reclining arms; joints obovate, about 10 x 17 cm., raised, tubercular at areoles, at first yellowish-green, but soon becoming glaucous gray-green, the tuberculation persisting for two or more years; leaves short, conical, 4–5 mm. long; areoles at first brown, subcircular or transversely elongated but finally elongated to 6 mm. on the sides of the joints and 3–4 mm. wide, on edges often becoming 4 x 7 mm.; spicules yellow in a crescentic tuft in center of areole, entirely surrounded by the brown wool, but later in an enlarged tuft occupying all of the upper part of the areole; spines 1 to 4, yellow, 1–2.5 cm. long, porrect, diverging but little; flower buds yellowish-green with closely appressed, short, wide floral segments; flowers yellow, turning to orange within at close of day, 6–7 cm. in diameter when opened, filaments greenish-tinged below, white above but becoming slightly tinged with red above at close of day, style white becoming tinged with red above at close of day, stigma white, 9-parted, subglobose to conical, truncate; fruit purplish-red throughout, pyriform, the stipe usually turning color tardily, about 46 x 80 mm., shallowly to deeply pitted. [PLATE 10.]

There appears to be no question but that the main coastal *Opuntia* of Florida is *O. maritima* of Rafinesque, although it does not appear to be so recognized in the literature. With reference to its affinity I will say that in my opinion it is more closely related to the South American group *O. inermis* DC. than any other. As the day advances the flower of this species turns to deeper yellow or almost orange within and to a deeper yellow in the distal portions of the petals as well. At the close of the day, or often early in the afternoon, the filaments and the apex of the style may show a slight tinge of reddish or orange-reddish, as is common in so many species. Color notes on *Opuntia* flowers are therefore of little value unless accompanied by an indication of the approximate time at which they were made.

It is a very prolific species, producing with us in California an

almost solid mass of fruit over the periphery of the plant. In Texas the growth is even more rampant, but the fruit production is much more restricted. It has been secured by us from various situations from the Carolinas to the east coast of Florida, and has been observed at one or two points on the west coast as well.

The specimen upon which this discussion is based has been carried under my inventory No. 8286, and was sent to me in 1906 by Mr. Harmon Benton from Georgia. He found it growing in a yard in Savannah.

Opuntia amarilla sp. nov.

A tall, open-branched tree 2.5–4 m. high with widely spreading branches, but in our cultivated plantation with vegetatively propagated plants not trimmed they are headed on the ground; joints glaucous blue-green, oval to obovate, mostly 17–20 x 35–38 cm. but very variable, turning slightly yellower and losing bloom, and becoming scaly black on old trunks; areoles brown, oval, 3 mm. long, abruptly raised the first season but flat later, enlarging in age to subcircular and 5–6 mm. in diameter; leaves conical, cuspidate, 3–4 mm. long, usually tinted at tip; spicules light yellow, inconspicuous or even invisible until late in the season, situated in a compact tuft in upper part of areole and not over 1 mm. long, more prominent at base of joints; spines white with translucent tips, porrect, diverging in all directions, on one-year-old joints usually 2 to 5, nearly all areoles armed, mostly 3 or 4, porrect, diverging in all directions, the central upper one reaching a maximum length of 3–4 cm., the lower 1 cm. long and the lateral ones midway between, increasing in number and length with age up to about 3 years, flattened, twisted, especially in age; buds rounded to bluntly pointed, dull dark olive with tinge of dull dark greenish-red at tip; flowers orange with darker center, having a tinge of red at base, filaments greenish below tinged with pink above, style red, stigma medium, dark green, 8-parted (one hour after anthesis), old flower turning deeper orange-red as day advances and distinct pinkish-red when closed; fruit large, obovate, 50–65 x 90–100 mm., at first turning yellowish but soon showing streaks and blotches of red in deeper tissues and finally becoming completely dull red with the stipe and the raised areoles at the apex usually remaining more or less yellow, even at complete maturity, rind yellowish and pulp light red; seeds medium sized, comparatively few in number and easily separable from the pulp, its areoles broadly obovate to subcircular, 2 mm. long, brown, 10–12 mm. apart with brown, prominent wool completely sur-

rounding the prominent tuft of yellow spicules which are 2–3 mm. long, all but lower areoles bearing 1, 2, 3 or 4 delicate, fugacious spines 5–12 mm. long.

This species secured in cultivation at Cardenas, Mexico, bears one of the finest fruits we have assembled in our entire collection. The species is characterized by its large, long, compact, glaucous joints and peculiarly colored fruits. At our Chico station it is not always hardy. We have, however, had plants of it fully 2 m. high with a spread of about equal dimensions. During the freeze of 1913 the plants went to the ground but we were able to save stock and at the present time (autumn, 1918) we have a number of individuals 2 meters in height and 2 meters in spread, loaded with fruit. One of the objections to the species in our plantations is its rather ungainly habit, which was overcome in the first planting made by a little pruning when the plants were young. No injury from cold has occurred excepting during the winter of 1913. In 1915 fruits of six of our best varieties were tested at Washington after shipment in mail packages from the Pacific coast. There was but one, which is probably an undescribed species, which scored ahead of this. The size, color, abundance and general attractiveness of this fruit always attract attention in our plantation.

UNITED STATES DEPARTMENT OF AGRICULTURE

Explanation of plates 9 and 10

PLATE 9

OPUNTIA DIVERSISPINA Griffiths. Showing both current and previous years growth toward the end of the growing season.

PLATE 10

OPUNTIA MARITIMA Raf. Showing young and mature joints, green fruits and buds.

The genus Desmatodon in North America

R. S. Williams

(with plate 11)

The work on this genus was mostly done some four or five years ago, but little has since occurred, so far as the author knows, to cause any important changes. Twelve species are here included in the genus as against thirteen in the Lesquereux & James Manual, but two of these thirteen species, *D. neomexicanus* and *D. nervosus* belong to *Tortula* while one other, *D. arenaceus*, is reduced to *D. obtusifolius*. This leaves ten of the Manual species, the two additions being *D. Sprengelii*, originally from Santo Domingo and discovered in Florida in 1916 by Dr. J. K. Small, and *D. stomatodontus* from Jalisco, Mexico.

Desmatodon Bushii Card. & Thér., from Missouri, belongs to *Tortula, fide* Brotherus; *D. Sartorii* (C. Müll.) Paris, from Mexico, is a *Leptodontium*; and *D. systylioides* Ren. & Card., from Newfoundland, a *Pottia*.

DESMATODON Brid. Musc. Recent. Suppl. 4: 86. 1819

Plaubelia Brid. Bryol. Univ. 1: 522. 1826.

Trichostomum § *Desmatodon* C. Müll. Syn. 1: 588. 1849.

Didymodon § *Desmatodon* Kindb. Eur. & N. Am. Bryin. 2: 273. 1897.

Dioicous or monoicous. Mostly alpine plants of medium or small size, usually growing in rather compact cushions on moist earth. Stems, mostly with central strand, simple or somewhat branching, closely leaved and more or less radiculose. Leaves erect-flexuous and appressed when dry; ovate and oblong to oblong-lanceolate or somewhat spatulate, concave, the margins flat, recurved or broadly incurved, entire or slightly serrulate in the upper part, sometimes colored or thickened, the apex mostly broadly acute, with costa vanishing below the apex, percurrent or excurrent into a short awn or elongate, nearly smooth hair-point. Costa in cross-section usually showing two or four guide-cells, one or two rows of large cells on the ventral side and on the dorsal side, a large stereid band, with outer cells more or less

differentiated. Cells of upper part of leaf mostly quadrate to hexagonal, scarcely or not elongate, obscure, densely papillose on both sides or distinct and more or less mamillose; those of lower part of leaf, pale, smooth and elongate-hexagonal to rectangular. Perichaetial leaves usually not greatly differentiated. Seta erect, often strongly twisted. Capsule oblong to cylindric, erect or nodding and curved, with stomata mostly few, in the basal part, the columella often projecting above the rim; the lid conic to more or less beaked. Annulus compound, often persistent. Peristome densely papillose, the sixteen teeth (sometimes scarcely developed in *D. obtusifolius*) from a basilar membrane usually extending well above the annulus, mostly divided to near the base into two or three slender, erect or oblique forks, or the forks sometimes quite irregular and more or less united above. Calyptra cucullate, descending well below the lid.

Type species: *Dicranum latifolium* Hedw.

Capsule erect and symmetric or nearly so; leaf margin of one thickness of cells.
- Cells of upper part of leaf more or less densely papillose with variously shaped papillae.
  - Leaf-margins somewhat recurved and leaves hair-pointed (except in *D. latifolius muticus* which is distinguished from *D. obtusifolius* by the leaves with margins partly flat and twice as long, 2.5–3 mm., and by the spores, 20 μ instead of 8–10 μ); the older leaves without a distinct golden-brown border.
    - Monoicous.
      - Upper leaves with blade usually 2–3 mm. long.
        - More or less spatulate or oblong, the upper marginal cells mostly obscure and rough with numerous papillae. 1. *D. latifolius.*
        - Gradually tapering from below the middle to an acute point. 2. *D. suberectus.*
      - Upper leaves with blade 1.5 mm., or less, long, the upper marginal cells distinct with few or no papillae. 3. *D. Guepini.*
    - Dioicous; blade of leaf about 2.5 mm. long. 4. *D. plinthobius.*
  - Leaf-margins mostly strongly revolute all round and leaves not hair pointed. 5. *D. obtusifolius.*
  - Leaf-margins flat, th older leaves with a distinct, golden-brown border. 6. *D. Porteri.*
- Cells of upper part of leaf never papillose, distinct, mostly mamillose on one or both sides.
  - Median leaf-cells 15–20 μ and spores about 25 μ in diameter. 7. *D. systilius.*

Median leaf-cells and spores 8–10 μ, or less, in diameter.
Leaf-cells highly mamillose on the upper surface, mostly flat on under side, the leaves slightly serrulate toward apex.
Leaves oblong-lanceolate, acute; costa slightly excurrent. 8. *D. Garberi.*
Leaves oblong-linear, the apex broadly rounded or broadly acute; costa vanishing 2–3 cells below the leaf-apex. 9. *D. Sprengelii.*
Leaf-cells mamillose on both sides; margins of the leaf crenulate half way down or more. 10. *D. stomatodontus.*
Capsule nodding, more or less curved; leaf-margins thickened.
Cells of lid scarcely elongate, in erect rows. 11. *D. cernuus.*
Cells of lid a little above the base elongate in oblique rows. 12. *D. Laureri.*

1. DESMATODON LATIFOLIUS (Hedw.) Brid. Musc. Recent. Suppl. **4**: 86. 1819

Dicranum latifolium Hedw. Descr. **1**: 89. 1789.
Barbula latifolia Kindb. Eur. & N. Am. Bryin. **2**: 252. 1897.

Autoicous, the male flower on a short stalk a little below the perichaetium with numerous club-shaped paraphyses surrounded by one or more broadly pointed, scarcely longer leaves: fertile plants in rather soft, green or brownish green tufts, reddish tomentose within; stems with central strand, erect, often branching, from a few mm. to 2 cm. high; upper stem-leaves more or less ovate or obovate to somewhat spatulate, the blade usually 2.5–3 mm. long and 1 mm. wide, mostly broadly acute, with costa nearly percurrent or excurrent into a terete, not quite smooth hair-point (or in var. *muticus* the hair-point lacking), the lower leaves smaller with costa vanishing below the apex; leaf-margins papillose, otherwise entire and more or less revolute on one or both sides; costa in cross-section showing mostly two large guide-cells, three or four cells nearly as large on ventral side, and on dorsal side a more or less distinct stereid band with two to four large outer cells; cells of upper part of leaf mostly square to short-rectangular, obscure with numerous round to oblong and c shaped papillae; perichaetial leaves scarcely differentiated; seta erect, twisted when dry, 1–1.5 cm. long; capsule erect, oblong to cylindric, 1–2 mm. long; annulus of one to three rows of cells, more or less persistent; peristome golden brown, densely papillose, the basal membrane extending well above the annulus, with teeth mostly split to near the base into two or rarely three slender, erect forks, or the forks sometimes united above and slit below; lid obliquely beaked, one third to one half the length of the rest of

the capsule, the cells near the base not elongate, those further up broadly oblong, in erect rows; calyptra smooth, cucullate, descending well below the rim of capsule; spores papillose, rather irregular, the larger 20–24μ in diameter. [FIG. 1.]

TYPE LOCALITY: Sweden or Lapland.

DISTRIBUTION: Greenland; Gaspé coast of Canada to Unalaska and southward to California and New Mexico.

EXSICCATAE: Aust. Musci App. *123*.

ILLUSTRATION: Sull. Ic. Musc. Suppl. *23*.

The var. *glacialis* Schimp. is evidently not distinct from the var. *muticus* Brid.

2. DESMATODON SUBERECTUS (Hook.) Limpr. in Rab. Krypt.-Fl. 4^1: 651. 1889

Tortula suberecta Hook. in Drummond, Musci Am. *145*. 1828.
Desmatodon obliquus B.S.G. Bryol. Eur. (18–20): Desmatodon 10. 1843.

Paroicous, the antheridia usually four or five with few, nearly filiform and somewhat longer paraphyses, in a cluster just below the archegonia: plants in rather dull green tufts with branching stems, 0.5–1 cm. high; leaves rather broadly ovate-lanceolate, the upper larger, 2–3 mm. long and 1 mm. wide, gradually tapering from below the middle to an acute apex and terminating in a nearly smooth awn usually less than 0.25 mm. long, the leaf margins crenulate-papillose and mostly recurved: costa stout, excurrent into the point, in cross-section mostly showing two large guide-cells, two rows of somewhat smaller cells on ventral side and on dorsal side a large stereid band with scarcely differentiated outer cells; cells in upper part of leaf from square to hexagonal, 12–16 μ in diameter, usually obscure with numerous, minute, often C-shaped papillae on both sides, those of lower part smooth, pale, mostly rectangular; perichaetial leaves scarcely differentiated; seta up to 18 mm. long; capsule oblong-cylindric, mostly slightly curved and nodding, about 2 mm. long without lid, the stomata in two rows near the base; annulus of one or two rows of small, persistent cells; peristome teeth sixteen, usually divided to near the base into two or three slender, papillose forks, or sometimes the forks more or less united, mostly twisted about half way round, from a basilar membrane extending well above the annulus and composed of very elongate cells with thick, projecting walls; lid high-conic, the cells just above the base elongate in very oblique rows; calyptra extending about half way down the capsule; spores rough, up to about 22 μ in diameter. [FIG. 2.]

TYPE LOCALITY: Rocky Mountains of British America.

DISTRIBUTION: Greenland; Beechey Island, Arctic America; the Canadian Rockies; also in Europe.

EXSICCATAE: Drummond, Musci Am. *145*.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl. 136*.

3. DESMATODON GUEPINI B.S.G. Bryol. Eur. (18–20): Desmatodon 8. 1843

Trichostomum Guepini C. Müll. Syn. 1: 590. 1849.

Barbula Guepini Schimp. Syn. ed. 2, 197. 1876.

Tortula Guepini Broth. in E. & P. Nat. Pfl. 1^3: 430. 1902.

Autoicous, the two or three very small male flowers scattered along the stem and composed of four or five pale, ecostate, ovate, acute leaves, smooth or nearly so, the outer longer ones about 0.5 mm. long, enclosing three or four antheridia about 0.25 mm. long, with few or no paraphyses: fertile plants rather loosely cespitose, bud-like, 1–3 mm. high; the larger upper leaves ovate to somewhat spatulate, with blade 1–1.5 mm. long, the apex somewhat rounded or acute, the margins entire and revolute from near the apex almost to base and the costa mostly smooth on the back, excurrent into a nearly smooth point one fifth to one half the length of the blade; costa in cross-section showing mostly two guide-cells, four or five cells of about the same size in one row on the ventral side and on the dorsal side a thick stereid band with outer cells differentiated; leaf-cells rather obscure and densely papillose in upper part of leaf, more or less four to six sided, not or scarcely elongate, 14–16 μ wide, those of basal part smooth, pale, larger, more or less rectangular: outer perichaetial leaves not differentiated, the inner small, acutely pointed, with flat margins; seta erect, about 8 mm. long; capsule erect, oblong-cylindric, 1–1.5 mm. long without lid, the stomata in one row near the base; annulus narrow, persistent, of one or two rows of cells; peristome pale, densely papillose, of sixteen slightly oblique, narrow teeth mostly divided nearly to the base into two filiform forks from a basilar membrane extending well above the annulus; lid high-conic, its height about twice the basal diameter, the cells a little above the base elongate in nearly erect rows; spores nearly smooth, the larger 16μ in diameter; calyptra cucullate, descending about half way down the capsule. [FIG. 3.]

TYPE LOCALITY: France.

DISTRIBUTION: California and France.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl. 133*.

4. DESMATODON PLINTHOBIUS Sull. & Lesq. Musci Bor. Am. *94*. 1856

Desmatodon neomexicanus Sull. & Lesq. Musci Bor. Am. *95*. 1856.

Dioicous, the male plants very similar to, and mixed with, the fertile tufts, the flowers terminal or lateral by innovations from just below the apex; the inner perigonial leaves short, acute, with pale, smooth cells extending two thirds way up the leaf, the antheridia often numerous, about 0.33 mm. long, with abundant, filiform paraphyses: fertile plants in compact cushions, with somewhat branching stems, 3–4 mm. or rarely 1 cm. high; leaves incurved-imbricate when dry, erect-spreading when moist, from oblong-lanceolate to narrowly lingulate with apex acute or rounded, those on lower stem with blade less than 1 mm. long with short point, on upper stem the blade up to 2.5 mm. long with a flexuous, smooth hair-point often of nearly equal length, the margins entire and mostly revolute from near the apex to below the middle; costa papillose on the back in upper part of leaf, in cross-section showing about four guide-cells with one or sometimes two rows of cells nearly as large on ventral side and on dorsal side a large stereid band with outer cells scarcely differentiated; cells of upper part of leaf obscure, somewhat four-sided, not elongate, about 8 μ wide, covered on both sides with very small, irregular, often C-shaped papillae, those of lower part rectangular, pale, smooth, up to 16 μ wide by 40 μ long; perichaetial leaves scarcely differentiated; seta erect, 6–12 mm. long; capsule oblong to nearly cylindric, erect, up to 3 mm. long without lid; the lid rather obtusely high-conic, 0.5–0.7 mm. long, the two or three basal rows of cells not elongate, those about one third above the base two or three times longer than wide, in slightly oblique rows; peristome teeth pale, densely papillose, erect, mostly very irregular, sometimes scarcely projecting above the annulus, or longer and quite regularly divided into two forks from a low basilar membrane; annulus large, two or three rows of cells in height; calyptra cucullate, long-beaked, descending about half way down the capsule; spores smooth, about 8 μ in diameter. [FIG. 4.]

TYPE LOCALITY: Charleston, South Carolina.

DISTRIBUTION: Pennsylvania to Alabama and westward to Missouri and Texas.

EXSICCATAE: Sull. & Lesq. Musci Bor. Am. *94*, *95* (as *D. neomexicanus*) and ed. 2, *123*; Aust. Musci App. *493*.

ILLUSTRATION: Sull. Ic. Musc. *pl. 30*.

5. DESMATODON OBTUSIFOLIUS (Schwaegr.) Jur. Laubm. Oesterr. Ung. 135. 1882

Barbula obtusifolia Schwaegr. Suppl. 1: 129. 1811.

Desmatodon oblongifolius Hook. in Drummond, Musci Am. *114*. 1828 (*nomen nudum*).

Tortula obtusifolia Schleich.; Broth. in E. & P. Nat. Pfl. 1^3: 430. 1902.

Desmatodon arenaceus Sull. in Gray, Man. ed. 2, 628. 1856.

Desmatodon ohioense Schimp. Syn. 159. 1860.

Desmatodon subtorquescens C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 48. 1892 (apparently).

Didymodon arenaceus Kindb. Eur. & N. Am. Bryin. 277. 1897.

Apparently dioicous, the male plant much like the fertile but the terminal flower forming a more distinct rosette, the perigonial leaves scarcely differentiated, enclosing ten to twelve oblong antheridia 0.2 mm. long with nearly filiform, slightly longer paraphyses (the European plants are said to become autoicous by the older male stems finally bearing archegonial flowers, a condition not observed in North American specimens): plants in compact cushions, 3–4 mm. to 1 cm. high, with stems more or less branching and radiculose at the base; leaves of lower stem very small, gradually larger upward, the upper 1–1.5 mm. long and 0.25–0.5 mm. wide, oblong-lingulate, broadly acute and somewhat apiculate or rounded and blunt at apex, the margin more or less revolute nearly all round and entire or slightly crenulate in the upper part; costa stout, vanishing a little below the apex or percurrent, smooth on the back or papillose in the upper part, in cross-section showing two to four guide-cells with one or two layers of somewhat smaller cells on the ventral side and on the dorsal side mostly a distinct stereid band with outer cells slightly or not differentiated; cells in upper part of leaf mostly obscure, densely papillose with partly C-shaped papillae, more or less four-sided, about 8 μ in diameter, those of lower part pale, smooth, about 12 μ wide and from nearly square to two or three times longer than wide; perichaetial leaves about like those of stem, the inner sometimes smaller; seta erect, up to 1 cm. long, often strongly twisted below to the left and above to the right; capsule nearly straight and erect, 2 mm. long, with stomata in one row in the short, scarcely distinct neck; peristome variable, pale to reddish brown, finely papillose throughout, the basilar membrane extending usually a little above the rim of the capsule and either bearing slightly oblique teeth once or twice divided into slender forks of unequal

size or sometimes the teeth reduced to short irregular lobes, scarcely evident above the persistent annulus of about two rows of cells; lid high-conic or shortly beaked, the cells in slightly oblique rows and mostly elongate about half way up the lid; spores smooth, up to 10 μ in diameter; calyptra cucullate, descending to about the middle of capsule. [FIG. 5.]

TYPE LOCALITY: Switzerland.

DISTRIBUTION: New Brunswick to Vancouver Island and southward to Ohio, Missouri, Arizona, and California; also in Europe, Turkestan and Africa.

EXSICCATAE: Sull. & Lesq. Musci Bor. Am. *93*, *120*; Holz. Musci Acro. Bor. Am. *17*.

ILLUSTRATIONS: Schwaegr. Suppl. 1: *pl. 129*; B.S.G. Bryol. Eur. *pl. 133*. Sull. Ic. Musc. *pl. 29*.

6. DESMATODON PORTERI James in Aust. Musci App. *123*. 1870

Barbula subcarnifolia C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 52. 1892.

Dioicous, male plants rather smaller than the fertile and mixed in with them, the flowers terminal or lateral by innovations from just below the apex, with outer antheridial leaves about 1 mm. long, broadly ovate-lanceolate, acute, papillose in upper part and costate, the inner leaves much smaller, pale, smooth, enclosing quite numerous antheridia about 0.2 mm. long with nearly filiform paraphyses: fertile plants in compact tufts with stems usually 2–3 mm. high; leaves spreading, flexuous or somewhat incurved when dry, the upper about 2 mm. long, mostly broadly ovate-lanceolate, the apex acute, the margins flat and in the older leaves rather distinctly yellowish-bordered from a little below the apex to near the base with two or three rows of somewhat larger more elongate cells, less densely papillose than those within or often smooth; in the younger leaves this border is scarcely evident or appearing only as a paler margin; costa percurrent, papillose on the back, in cross-section showing about four guide-cells with a row of three or four cells of about equal size on ventral side and on dorsal side a large stereid band with outer cells differentiated; cells of upper part of leaf mostly very obscure with minute, often C-shaped papillae, the median cells not elongate, somewhat four-sided, about 8 μ in diameter, those in the border about one half way down mostly elongate; the cells of lower one third of leaf pale, smooth, shortly rectangular or elongate-hexagonal; perichaetial leaves slightly differenti-

ated; seta erect, mostly 7–10 mm., rarely 13 mm. long; capsule erect, nearly straight and cylindric, about 2 mm. long without lid, with a conical more or less short-beaked lid 0.50–0.75 mm. long, the cells from a little above the base mostly oblong in slightly oblique rows; annulus large, persistent, of two or three rows of cells; peristome papillose, reddish or golden brown, the erect or nearly erect teeth from a basal membrane projecting a little above the annulus and irregularly divided into two or three forks, or the forks sometimes more or less united; spores smooth, about 8 μ in diameter; calyptra cucullate, long-beaked, extending one third way down the capsule. [FIG. 6.]

TYPE LOCALITY: Easton, Pennsylvania.

DISTRIBUTION: Gaspé coast, Quebec, and Point Pelee Island, Lake Erie, Ontario, to Pennsylvania, Ohio and Illinois.

EXSICCATAE: Aust. Musci App. *123*.

ILLUSTRATION: Sull. Ic. Musc. Suppl. *pl. 23*.

7. DESMATODON SYSTYLIUS B.S.G. Bryol. Eur. (18–20): Desmatodon, Suppl. 1. 1. 1843

Paroicous, the antheridia about 0.25 mm. long, in one or two pairs, without paraphyses, in the axils of the outer perichaetial leaves: plants cespitose, somewhat branching, usually 2–3 mm. high, often more or less bud-like; the upper stem leaves with blade about 1.5 mm. long and 1 mm. wide, broadly ovate, acute, the margins mostly flat and entire or slightly crenulate at apex and the costa excurrent into a nearly smooth, flexuous, hair-point of variable length; the costa in cross-section showing two guide-cells with two often larger cells on the ventral side and on the dorsal side a large stereid band with differentiated outer cells; cells of upper part of leaf from nearly square to rhomboidal or hexagonal, somewhat mamillose, the median 15–20 μ in diameter, in lower part mostly rather larger and elongate-hexagonal or short-rectangular; perichaetial leaves scarcely differentiated; seta erect, about 8 mm. long; capsule erect, oblong-cylindric, up to 2 mm. long without lid, the columella exserted, persistent, the stomata in about two rows near base; annulus persistent, of one or two rows of cells; peristome teeth reddish brown, papillose, mostly divided to near the base into two forks, erect from a rather low basal membrane; lid remaining more or less attached to the columella after separating from the annulus, obliquely short-beaked, the cells, except the three of four basal rows, elongate, in slightly oblique rows; calyptra cucullate, descending well down the capsule; spores rough, up to 25 μ in diameter. [FIG. 7.]

TYPE LOCALITY: Norway.

DISTRIBUTION: Greenland and Newfoundland to the Canadian Rocky Mountains and at the foot of Mount Dana, California; also in Europe.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl. 131.*

8. DESMATODON GARBERI Lesq. & James, Man. 112. 1884

Hyophila fragilis Card. Rev. Bryol. **36**: 75. 1909.

Dioicous, the male plants very slender, with a rosette-like apical flower, the outer perigonial leaves scarcely differentiated, the inner shorter, ovate-acute, entire, costate, enclosing ten to fifteen antheridia about 0.3 mm. long, with filiform, somewhat longer paraphyses: fertile plants in compact cushions with slender, erect, mostly unbranched stems 5–6 mm. high and about 0.2 mm. in diameter with distinct central strand and few or no radicles above the base; stem leaves rather distant, incurved or somewhat crispate and subtubulose when dry, the upper 1–1.5 mm. long, oblong-lanceolate, acute, with margins incurved and entire or occasionally with a few small teeth near the apex, flat and entire below; costa stout, sometimes rough on the back in the upper part, percurrent, in cross-section showing two to four guide-cells with one or two rows of smaller cells on the ventral side and on the dorsal side a large stereid band with outer cells scarcely differentiated; cells of leaf distinct, more or less golden brown from apex to base of leaf, those of upper part highly mamillose on the ventral side, mostly nearly flat on the dorsal side, the median cells roundish, about 8 μ in diameter, the basal smooth and rather short-rectangular; perichaetial leaves scarcely differentiated or sometimes one or two very small inner leaves; seta erect, 5 mm. long; capsule somewhat fusiform, its greatest diameter a little below the middle, 1–1.3 mm. long without lid, the stomata in one row near the base; annulus of one or two rows of cells; teeth of peristome reddish brown, papillose, irregular, divided often nearly to base into two slender forks, from a papillose basilar membrane scarcely extending above the rim of capsule; lid nearly erect, conical, short-beaked, about one third the length of the capsule, the cells elongate in nearly erect rows; spores smooth, 6–8 μ in diameter, calyptra cucullate, extending well down the capsule, sometimes split upward to near the smooth apex. [FIG. 8.]

TYPE LOCALITY: Key West, Florida.

DISTRIBUTION: New Providence, Bahama Islands; Key West, Florida; and Yucatan, Mexico.

The specimens of *Hyophila fragilis* are not fruiting but they do not seem to differ from *D. Garberi* except perhaps in being a little more slender.

9. **Desmatodon Sprengelii** (Schwaegr.) comb. nov.

Barbula Sprengelii Schwaegr. Suppl. 2[1]: 64. 1823.
Plaubelia tortuosa Brid. Bryol. Univ. 1: 522. 1826.
Weisia Berteriana Spreng. Syst. Veg. 4: 156. 1827.

Dioicous, the male flower terminal, the short, inner antheridial leaves closely surrounding about six large antheridia, one third mm. long, with few, filiform paraphyses: fertile plants low, in dusky green cushions with simple, slender stems mostly 4–5 mm. long; leaves on the stem below rather distant, gradually and slightly larger and more crowded toward the apex, incurved when dry, widely spreading when moist, the upper about 1 mm. long, oblong linear, with broad, somewhat rounded or broadly acute, slightly apiculate and serrulate apex, the margins from a little below the apex to the middle of leaf or farther, incurved and entire; costa stout, often slightly rough on the back near the apex and the ventral surface more or less mamillose, vanishing two or three cells below the apex of the leaf, in cross-section showing two or three guide-cells with an equal number of somewhat smaller cells on the ventral side and on the dorsal side a stereid band with outer cells differentiated; cells of upper part of leaf distinct, roundish-hexagonal, 6–7 μ in diameter, mamillose on the upper side, flat or nearly so on the under side, in about the lower fourth of leaf becoming square to short rectangular with colored, slightly thickened walls as in cells of upper leaf; perichaetial leaves mostly a little longer than those of the stem with a somewhat broader, loosely clasping base rather gradually narrowed to a not quite entire, more acute point; seta erect, about 4 mm. long; capsule erect, somewhat fusiform, about 1.5 mm. long without lid, the exothecal cells rather irregular, two to four times longer than broad, with thin walls, the stomata few, near the base; peristome reddish brown, the basal membrane extending about the height of the annulus above the rim, with 16 erect, quite irregular, finely papillose teeth of variable length either undivided or more or less divided along the median line; lid somewhat obliquely subulate, about two thirds the length of the rest of the capsule; spores about 8 μ in diameter, pale and smooth; calyptra cucullate, extending about half way down the capsule. [FIG. 9.]

TYPE LOCALITY: Hispaniola (Santo Domingo).

DISTRIBUTION: known only from Santo Domingo and Florida (Cape Sable, 1916, *J. K. Small*).

10. **Desmatodon stomatodontus** (Card.) comb. nov.

Hyophila stomatodonta Card. Rev. Bryol. **36**: 76. 1909.

Dioicous: plants with slender stems 4–8 mm. long; lower leaves minute, the larger crowded into a rosulate tuft at the apex of the stem, somewhat spatulate-oblong, flexuous with strongly inrolled margins when dry, more or less widely spreading when moist, about 1.5 mm. long, mostly obtuse and scarcely apiculate, the margins finely crenulate to below the middle; costa percurrent, 40 μ wide a little above the base, in cross-section showing two large guide-cells, three to four rather large cells above them and below a large stereid band with the outer cells differentiated; cells in upper part of leaf distinct, roundish to hexagonal, mamillose on both sides, 6–8 μ in diameter, in the lower leaf, square to short-rectangular and scarcely paler than above; one or two inner perichaetial leaves sometimes lanceolate, acute, with the costa scarcely percurrent; seta about 5 mm. long; capsule erect, cylindric, about 1.5 mm. long without lid, the exothecal cells mostly irregularly elongate, with thin walls, the median cells about 20 μ wide by 40–50 μ long; lid about one-half the length of the capsule, nearly erect, with cells a little above its base elongate in nearly erect rows; annulus large; peristome reddish brown, papillose, fragile, irregularly divided from some distance above the rim into slender forks extending about 150 μ above the rim; spores smooth, pale, 7–8 μ in diameter. [FIG. 10.]

TYPE LOCALITY: State of Jalisco, Mexico.

DISTRIBUTION: known only from type locality.

11. DESMATODON CERNUUS (Hueb.) B.S.G. Bryol. Eur. (18–20): Desmatodon 8. 1843

Dermatodon cernuus Hueb. Musc. Germ. 117. 1833.

Cynodontium latifolium Schwaegr. Suppl. 1[1]: 110. 1817 (not *Dicranum latifolium* Hedw. Desc. 1: 89. 1787).

Desmatodon camptothecius Kindb.; Macoun, Cat. Can. Pl. 6: 48. 1892.

Dermatodon camptothecius Kindb. Eur. & N. Am. Bryin. 2: 283. 1897.

Autoicous, the male flower just below the perichaetium, composed of several club-shaped, often long-stalked antheridia, with rather numerous, slightly club-shaped paraphyses, enclosed by two ovate-lanceolate, costate leaves about 1 mm. long, either entire or with one or two rather large teeth at the acute apex: plants in compact cushions with mostly simple stems from 3–4

mm. up to 2 cm. high; stem leaves more or less erect or flexuous and twisted when dry, from oblong-linear to oblong-spatulate, up to 3.5 mm. long by 1 mm. wide, acute, the margins toward apex flat and mostly not quite entire, of a single layer of cells, farther down more or less revolute on one or both sides and usually of a double layer of two to four rows of slightly colored cells; costa smooth on the back, mostly excurrent into a short awn, in cross-section showing two guide-cells, a single row of about three cells nearly as large on the ventral side and on the dorsal side a stereid band with the outer cells differentiated; cells of upper part somewhat rhomboidal to hexagonal, up to 20 μ wide by 25 μ long, rarely smooth or nearly so but mostly papillose on both sides; cells of lower part smooth, lax, pale, up to 30 μ wide by 140 μ long; perichaetial leaves scarcely differentiated; seta erect, 1.5–2 cm. long, yellow or finally reddish; capsule nodding to horizontal, somewhat curved-ovate, the mouth rather small and oblique, the few stomata in one row at the base; peristome reddish brown, densely papillose, the teeth mostly divided irregularly into two forks, one or both of which are more or less perforate or split in the lower part, the basilar membrane extending well above the rim; annulus persistent, of one to three rows of rather small cells; lid obliquely short-pointed, its height slightly exceeding its basal diameter, the cells in erect rows and scarcely elongate except in the point; calyptra cucullate, rather small, the apex smooth and dark colored; spores papillose, 30–50 μ in diameter. [FIG. 11.]

TYPE LOCALITY: Tyrol, Austria.

DISTRIBUTION: Gaspé coast, Quebec, to the Yukon River, and southward to Colorado.

EXSICCATAE: Macoun, Can. Musci *71*, *604*.

ILLUSTRATIONS: Schwaegr. Suppl. 1[1]: *pl. 28*; B.S.G. Bryol. Eur. *pl. 134*.

12. DESMATODON LAURERI (Schultz) B.S.G. Bryol. Eur. (18–20): Desmatodon 9. 1843

Trichostomum Laureri Schultz, Flora **10**: 163. 1827.

Tortula bryoides Hook. in Drummond, Musci Am. *135*. 1828.

Autoicous, the male flower sessile just below the perichaetium, of eight or ten more or less stalked antheridia about 0.5 mm. long, with abundant, often longer, club-shaped paraphyses, enclosed by two or three ovate, entire, somewhat acute leaves, with the costa vanishing just below the apex: plants in compact tufts from a few millimeters to 2 cm. high, with somewhat branching stems more or less tomentose below; the lower stem leaves ovate, the upper longer, more or less erect-flexuous and twisted when dry, nearly

linear, the base often a little broader, 4 mm. long and 1 mm. wide, rarely 5.5 mm. long and 1.5 mm. wide, the point rounded or broadly acute and mostly apiculate by the shortly excurrent costa; leaf-margin, except near the flat and not quite entire apex, with a distinct, thickened and recurved border extending to near the base; costa papillose on the back to below the middle, in cross-section showing two or three guide-cells, usually a single layer of large cells on ventral side, but sometimes two layers, and on dorsal side a large stereid band with outer cells somewhat differentiated; cells of upper part finely papillose on both sides, rhomboidal to hexagonal, the median about 16 μ wide by 18–25 μ long, the basal cells, often 20 μ wide by 50–80 μ long, smooth and more or less tinged with golden brown: perichaetial leaves scarcely differentiated; seta somewhat flexuous, 8–15 mm. long; capsule nodding to horizontal, sometimes pendant, oblong, more or less curved, up to 2 mm. long without lid, the stomata in one row at the base; peristome reddish brown, the distantly articulate teeth often twisted almost once around and divided nearly to the base into two or three slender, terete, sometimes split or perforate forks or the forks sometimes united above; annulus persistent, of two or three rows of small cells; lid conic, short-pointed, the three or four basal rows of cells not elongate, those above elongate-rectangular, in very oblique rows; calyptra cucullate, extending about one half way down the capsule; spores papillose, 30–40 μ in diameter. [FIG. 12.]

TYPE LOCALITY: Tyrol, Austria.

DISTRIBUTION: Rocky Mountains of British America and Vancouver Island to Colorado; also in Greenland, Europe and Asia.

EXSICCATAE: Drummond, Musci Am. *135*.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl. 135*.

Explanation of plate 11

Cross-sections of *Desmatodon* made about half way down the leaf.

FIG. 1. *Desmatodon latifolius* (Hedw.) Brid., from California, × 270.

FIG. 2. *Desmatodon suberectus* (Hook.) Limpr., from Canada, × 270.

FIG. 3. *Desmatodon Guepini* B. S. G., from California, × 270.

FIG. 4. *Desmatodon plinthobius* Sull. & Lesq., from South Carolina, × 270.

FIG. 5. *Desmatodon obtusifolius* (Schwaegr.) Jur., from Montana, × 270.

FIG. 6. *Desmatodon Porteri* James., from Pennsylvania, × 200.

FIG. 7. *Desmatodon systylius* B. S. G., from Labrador, × 270.

FIG. 8. *Desmatodon Garberi* Lesq. & James, from Florida, × 270.

FIG. 9. *Desmatodon Sprengelii* (Schwaegr.) R. S. Williams, from Santo Domingo, × 270.

FIG. 10. *Desmatodon stomatodontus* (Card.) R. S. Williams, from Mexico, × 350.

FIG. 11. *Desmatodon cernuus* (Hueb.) B. S. G., from Canada, × 270.

FIG. 12. *Desmatodon Laureri* (Schultz) B. S. G., from Colorado, × 270.

Notes on trees and shrubs in the vicinity of Washington

W. W. Ashe

There are a number of trees and shrubs which are apparently not recorded* as occurring in the vicinity of Washington, D. C., but which the writer has collected within distances which should allow inclusion in its flora. Several interesting forms of *Amelanchier* are included in this number and also several species belonging to various other genera.

Species and varieties of Amelanchier

The catalogue of the Washington Botanical Club credits four species of *Amelanchier: A. canadensis* (L.) Medic. (*A. Botryapium* Aut.), *A. laevis* Wiegand (*A. canadensis* Aut.), *A. oblongifolia* (T. & G.) Roem., and *A. stolonifera* Wiegand (?*A. nantucketensis* Bicknell). *A. laevis* is not common near Washington, but another associate of *A. canadensis*, which McAtee† has seemingly correctly referred to *A. intermedia* Spach, is frequent; this form so intergrades with *A. canadensis* that it should probably be regarded as a variety of that species. In addition to these *A. sanguinea* (Pursh) DC. occurs along the Potomac at Great Falls, Virginia, and growing with it are two other unrecorded forms. The first of these is here proposed as new; the second seems to be a hybrid or of hybrid origin and approaches *A. oblongifolia* var. *micropetala* Robinson,‡ the hybrid origin of which has already been suggested by Wiegand.§ Robinson's variety is here raised to specific rank and the form in question referred to it as a variety.

Amelanchier canadensis intermedia (Spach.) comb. nov.

Amelanchier intermedia Spach, Hist. Veg. Phan. **2**: 85. 1834.

Differs from the type in its smaller and usually less pubescent leaves, which are slightly bronze when unfolding; and in having

* The species in question are not mentioned in the Botanical Club's letter press catalogue; in Ward's Guide to the flora of Washington and vicinity; in any of the five supplements to that work; or, seemingly, in any subsequent publication.

† Biol. Soc. Washington, Bull. 1: 79. 1918.

‡ Rhodora **10**: 33. 1908.

§ Rhodora **14**: 133. 1912.

smaller flowers with narrow, often acute petals and a slightly larger hypanthium with very narrow sepals.

Frequent in bogs near Beltsville, Maryland.

AMELANCHIER SANGUINEA (Pursh) DC.

On shaded rocks along the Potomac River, at Great Falls, Virginia, ten specimens noted.*

Amelanchier sera sp. nov.

A shrub 1.2–4 m. high with habit (single-stemmed and bushy topped) much like that of small specimens of *A. canadensis*. Leaves 3–6 cm. long, 2.5–4 cm. wide, ovate or elliptic, rounded or subcordate at the base, obtuse or rounded and abruptly apiculate at the apex (the upper leaves on the twigs differing in being obovate and cuneate at the entire base), rather distantly serrate with short apiculate teeth, prominent veins in six to eight pairs, surface thickly coated with a grayish tomentum and more or less bronze colored upon unfolding, becoming nearly or quite glabrous at maturity, thick and firm, dark blue-green and lucid above, pale and glaucescent beneath, turning dark crimson in autumn; petioles one fourth to one third as long as the blades, often reddish at the base. Flowers appearing in late April and early May, in six- to eleven-flowered nodding racemes, 4–6 cm. long; petals oblong-spatulate, acute, 8–11 cm. long, 2.5–3 mm. wide; hypanthium small, 6–7 mm. across, from tip to tip of sepals, shallow, glabrous within, tube becoming glabrous before the opening of the flowers; sepals sometimes remaining slightly pubescent within until fruit is half grown, reflexed after anthesis and remaining so on mature fruits; summit of ovary glabrous. Fruit in four- to eight-fruited racemes, globose, 4–6 mm. thick, dark reddish purple when ripe (latter half of June), the lower fruiting pedicels 2–2.5 cm. long.

On rocky banks along the Potomac River, Fairfax County, Virginia, and Montgomery County, Maryland.

This new species blooms just after *A. canadensis*, when *A. stolonifera* and *A. oblongifolia* are entirely through blooming and *A. sanguinea* is still in bloom. It grows in association with all four of these species and also with the new variety to be described below. From *A. canadensis* (and also *A. laevis*) it is separated by its much smaller flowers, later blooming, more shallow hypan-

* Not included in McAtee's list of characteristic plants of Great Falls, *op. cit.* 107.

thium, and red (not yellow) autumnal foliage; from *A. oblongifolia*, by its darker green, more lucid, and relatively broader leaves, later blooming, and reflexed (not ascending) sepals; from *A. stolonifera*, by its habit and size, later blooming, smaller calyx, glabrous hypanthium, and by the different color and texture of its leaves. The inflorescence of *A. sera*, on account of the numerous bright scarlet bracts, has a decidedly reddish aspect (resembling that of *A. saxatilis* Blanch.), until the bracts fall as the petals being to expand. For several seasons this plant was regarded as *A. laevis* forma *nitida* Wiegand,* but Dr. Wiegand, after examining a specimen, states that it is not his plant. Specimens are being deposited in several American herbaria.

Amelanchier micropetala (Robinson) sp. nov.

Amelanchier oblongifolia var. *micropetala* Robinson, Rhodora **10**: 33. 1908.

According to Wiegand the probable parents of this supposed hybrid are *A. oblongifolia* and *A. stolonifera*. The general distribution of the plant, however, the fact that it has been reported from points where the putative parents are not now known to grow,† and its local abundance in certain localities seem to justify disregarding its probable hybrid origin. *A. micropetala* is distinguished from *A. oblongifera* by its shorter, broader, firmer and somewhat darker leaves, and from both *A. oblongifolia* and *A. stolonifera* by its petals, which are scarcely half as long and yellowish or cream-colored instead of being white. Weatherby‡ considers the peculiar features of the petals may be due to the teratological condition known as staminody. The typical form of *A. micropetala* is known from eastern Massachusetts and Connecticut.

Amelanchier micropetala potomacensis var. nov.

A slender, stoloniferous shrub with the general size (3–10 dm. high), habit (forming small clumps) and leaf-shape of *A. stolon-*

* Rhodora **14**: 155. 1912.

† Dr. Macbride writes that the supposed parents do not grow within many miles of plants of *A. micropetala* collected by Mr. Weatherby.

‡ Rhodora **18**: 49. 1916.

ifera. Leaves ovate, elliptic or orbicular, 2.2–4.5 cm. long by 2–3.1 cm. wide, obtuse or rounded and abruptly acute at the apex, rounded or subcordate at the base, finely and sharply serrate above the middle with acute, ascending teeth, densely white-tomentose beneath when young but soon becoming glabrous on both sides, deep green but not lucid above, slightly pale beneath, coloring shades of red in autumn; ascending prominent veins in six to nine pairs; petioles from one third to one half the length of the blades. Racemes erect, straight, short, dense, seven- to ten-flowered, grayish villose on unfolding, the bracts pale tan, the erect lower pedicels 1.2 –1.8 cm. long in flower, 1.5–2.2 cm. long in fruit; hypanthium large, tube cup-shaped, villose without, usually tomentose within; sepals short from a broad base, ascending or erect after petals fall; petals five, 3–5 mm. long, 1–3 mm. broad, obovate on spatulate, yellowish white or dull yellow; blooming period extending on some plants from late April to late May. Fruit subglobose or depressed-globose, the summit of the ovary usually lanate, 6–10 mm. thick when fully mature (the last week in June except on some of the upper pedicels), sweet and juicy, purple-black without bloom, capped by the erect calyx lobes.

On rocky banks along the Potomac River, Fairfax County, Virginia. Specimens are being deposited in several herbaria.

The variety here proposed shows the remarkable small yellowish petals, which are characteristic of the typical *A. micropetala*. Its blooming period begins with that of *A. stolonifera* and *A. oblongifolia* but continues two weeks longer. It is further characterized by its very large hypanthium. Specimens were submitted to the Gray Herbarium for comparison with the var. *micropetala* Robinson, and Dr. J. F. Macbride, who made the comparison, reports that its leaves closely match some of the material from Connecticut, which "exhibits the very broad leaves of *stolonifera*." It is therefore probable that this material should be also referred to the var. *potomacencis*. In its Potomac station, the new variety blooms at about the same time as *A. sera*, with which it is associated. Its petals exhibit considerable variation in size, but no specimens were seen in which the number exceeded five or in which there was actual loss of the petal form, agreeing in these respects with the material of *A. micropetala* described by Weatherby. If the plant was originally a teratological form it would now seem from its local abundance to have become self-perpetuating.

MISCELLANEOUS SPECIES AND VARIETIES

In addition to the forms of *Amelanchier* discussed above the following trees and shrubs, which apparently have not previously been credited to the Washington flora, have been found growing either in the District of Columbia or in nearby parts of Virginia and Maryland.

Carya glabra hirsuta (Ashe) comb. nov.

Hicoria glabra hirsuta Ashe, Notes on hickories. 1896.
Carya ovalis hirsuta Sargent, Bot. Gaz. **66**: 247. 1918.

This tree is not uncommon on rocky wooded slopes along the Potomac River at Great Falls, Virginia, and should be included among the trees which are characteristic of its flora. It has not been reported previously from north of North Carolina.

QUERCUS PAGODA Raf. Alsog. Am. 23. 1838

Edges of swamps near North Chesapeake Beach, Maryland. Not before credited to the Washington flora, although known from as far north as the island of Nantucket, Massachusetts.

QUERCUS SHUMARDII Buckl.

Growing with the preceding but not previously credited to the Washington flora. Attention has recently been called to the fact that *Q. Schneckii* Britton is a synonym of this species.*

CRATAEGUS APPOSITA Sargent

Great Falls, Virginia. This and the following have apparently not before been reported from south of Delaware and Pennsylvania.

CRATAEGUS SMITHII Sargent

Growing with the preceding.

TILIA MICHAUXII Nutt.

Along the Potomac River from above Great Falls to below Marshall Hall, Virginia, but not before credited to the Washington flora.

* Bull. Charleston Mus. **14**: 9. 1918.

TILIA NEGLECTA Spach

Growing with the preceding but in greater abundance, the largest specimens seen being eighteen inches in diameter and sixty feet high. Sargent* has recently called attention to this very distinct species, which for several years has been a puzzle, being regarded as a probable form of *T. Michauxii*.

FRAXINUS CAROLINIANA Mill.

Along the Potomac River, Virginia, opposite Washington, and apparently the northern limit of the species. The species is the most characteristic tree in several hundred acres of river swamp, but has apparently never been included in the Washington flora.

FOREST SERVICE,
U. S. DEPARTMENT OF AGRICULTURE.

* Trees at Mount Vernon 5. 1917.

INDEX TO AMERICAN BOTANICAL LITERATURE

1908–1919

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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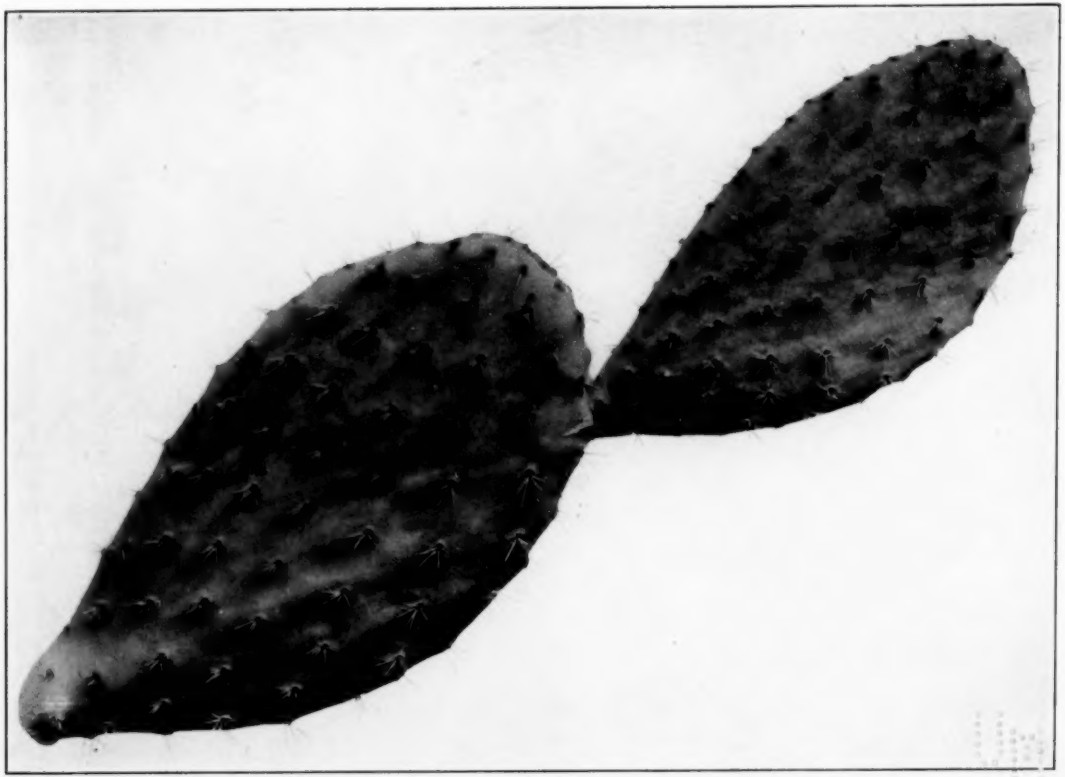

OPUNTIA DIVERSISPINA GRIFFITHS

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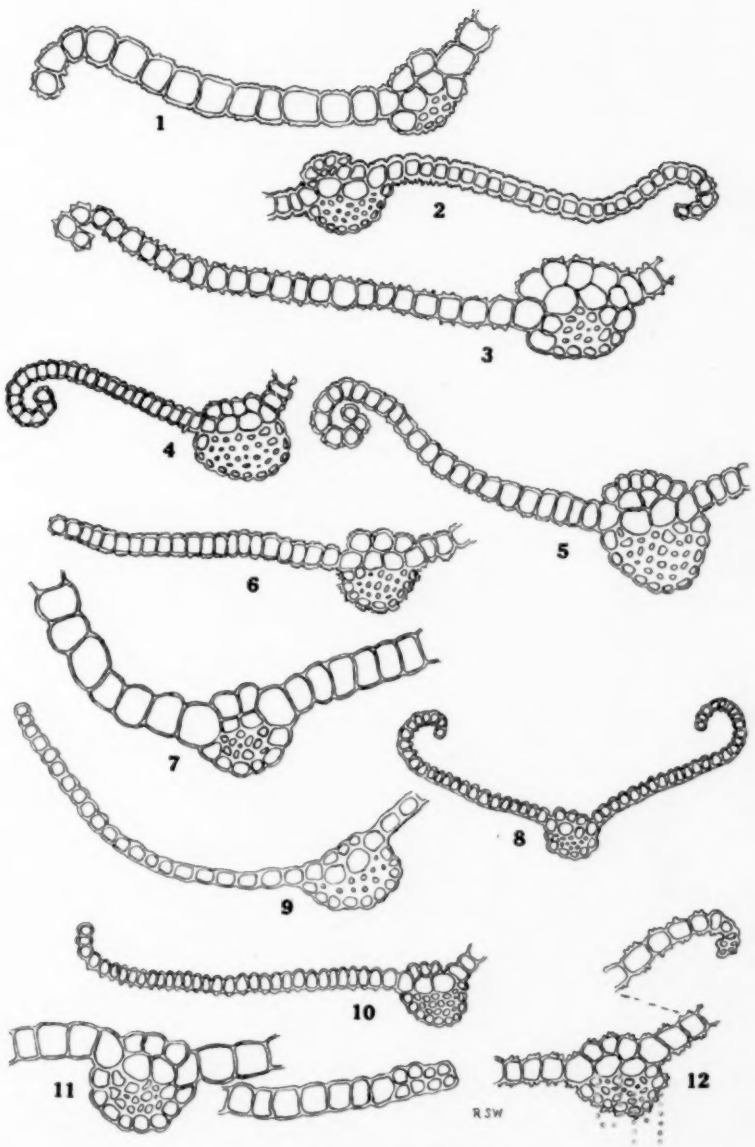

WILLIAMS: DESMATODON